

## Grade 7 Design Challenge Quick Guide: Design Bug Models – Cycle 2

**Lesson Objective(s):** Students will design bug models to deepen their understanding of sexual reproduction.

### Materials:

*For teams of 2-3 students*

- 2 Paper bags (one for male, female parents)
- Wooden popsicle sticks (chromosomes)
- Styrofoam ball “body segments” or stale marshmallows
- Toothpick “antennae” and “body connectors” (flat and round)
- Pipe cleaner “legs” (two colors)
- Paper clip “wings” (multiple colors)
- Push pin “eyes” (colored and clear)
- Data table handouts (optional)
- Student design logs

### Websites

- <http://www2.edc.org/weblabs/punnett/punnettsquares.html>
- <http://www.athro.com/evo/gen/punexam.html>
- [http://www.zerobio.com/drag\\_gr11/mono.htm](http://www.zerobio.com/drag_gr11/mono.htm)
- Suggested gallery walk guidelines:  
<http://serc.carleton.edu/sp/library/gallerywalk/index.html>

### Handouts

- “Punnett Square Practice” handout
- “...Punnett Square Predict Actual Ratios?” handout
- “...Punnett Square Predict Actual Ratios?” handout
- 21<sup>st</sup> Century Skills rubric for project grading

### TEKS:

#### Science

\***SCI 7.14B** Compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction.

**PS** **SCI 7.2E** Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.

#### Math

**PS** **MATH 7.1A** Apply mathematics to problems arising in everyday life, society, and the workplace.

**MATH 7.4B** Calculate unit rates from rates in mathematical and real-world problems.

ELPS	CCRS Science	CCRS Math	CCRS Cross-disciplinary
C1C, C3J	1A4A, 5E1A	10A2A	1B3C, 1C3C

**Engineering Design Loop:** *For more details, refer to the overview page.*

**Identify the Need:** Teams of students will be challenged to design bug models to demonstrate sexual reproduction.

**Research the Problem** Teams will conduct research on the use of Punnett Squares to assist in predicting sexual reproduction outcomes.

**Develop Possible Solutions:** Teams will begin to plan for the design of their bug by determining its genotypes and phenotypes.

**Select the Most Promising Solution:** Teams will use their data table to determine which supplies they will need to build their offspring and then collect the necessary materials.

**Construct a Prototype:** Teams will then build a model of the offspring using the genotype and phenotypes from their data table.

**Test & Evaluate:** Teams will respond to the following question in their design logs: “Why do we sometimes have our parents’ traits, but not always?” to evaluate their work so far.

**Communicate their Design:** Students will participate in a gallery walk to showcase their bug designs.

**Redesign:** Teams will create a second generation bug by crossing one team’s bug with another.

**Math Connection:** Students will use their knowledge of Punnett Squares to compare predicted ratios to actual ratios.